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WELLINGTON BRINK
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Art Work by
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FOOD FOR THOUGHT.—

The annual banquet of the Jaspar County (Iowa) Soil Conservation District came up with a unique idea or two which may commend themselves to other occasions of the kind. The menu leaflet was decorated appropriately by the design reproduced—with slight modifications—herewith. And the bill o' fare itself was of more than ordinary interest:

Ham.—From a hog grown on rotation pasture and a balanced ration.

Candied sweet potatoes.—Fortified with minerals derived from good soil management.

Peas.—Grown on the contour.

Mixed green salad.—High in essential vitamins and minerals; grown with commercial fertilizers on good topsoil.

Rolls.—From wheat grown in strip cropped fields.

Ice cream and wafers.—From a contented cow fed on improved brome-alfalfa pasture.

Coffee.—The product they[1] have an awful lot of in Brazil.

[1] Where they also have a lot of erosion, but where SCS has trained several Brazilian technicians to do something about it. (Footnote added by H. H. Bennett.)

THE COVER.—Leading off this issue is A. F. Hallowell's photograph of Donna Hoke and her dog Lassie. Donna is a prime exponent of the fact that happy people come of happy land.

Donna is 6 years old and in the first grade at school. She is the youngest of seven children, the other D's being Dorothy, Druscilla, Delia, Dietta, Dennis and Dale.

Donna's father, William G. Hoke, operates two farms in York County, Pa. He was one of the first men in his community to request a soil conservation program. Last year he wrote the supervisors of the York Soil Conservation District: "Before 1937, when I first instituted soil conservation practices, I was troubled continually with gullies, fertility washing on the road and highway, which at one time caused a serious accident. The sloping portion of my farm, under cultiva-

(Continued on page 225)

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Flood Control on the LITTLE SIOUX

By GEORGE C. LAMP

On the Little Sioux watershed in northwestern Iowa two Federal agencies are coordinating their work to solve a problem of recurrent flooding. Downstream, the Corps of Engineers plans to enlarge and stabilize major channels and build a system of dikes. This will increase the river's carrying capacity.

Upstream, the Soil Conservation Service has completed surveys and launched a 15-year program designed to retard runoff from the land and reduce sedimentation. Its measures include land-use changes, waterflow retardation, erosion prevention, and channel improvement works.

The Little Sioux program, is the first flood control activity launched by the Department of Agriculture in the Missouri River Basin. It, therefore, is of national importance.

Works of improvement for the watershed were authorized by Congress in Public Law 534, December 22, 1944. The approved program authorized Federal funds of $4,280,000 for development of detailed work plans for tributaries and subwatersheds and for other operations. Approximately $2,500,000 will be used for major gully control.

An additional $1,627,000 in labor, equipment and materials will be supplied by farmers, by State, and by local sources.

The Little Sioux watershed covers approximately 4,500 square miles of northwestern Iowa and southwestern Minnesota, 93 percent of it being in Iowa.

The river rises in Nobles and Jackson Counties, Minn. From there, the main stem flows southwest to south, emptying into the Missouri River at a point about halfway between Sioux City and Omaha.

Glacial soils are found in the northern tip of the watershed but deep loessial deposits predominate in two-thirds of the area. These soils are highly erodible. Inasmuch as slopes in the southern part of the basin range from 8 percent to 50 percent, large areas of land suffer severe erosion. An extensive network of gullies of great depth is advancing rapidly into upland farms.

The trench-type gullies which have cut down through the loessial soil to depths of 60 and 70 feet are the major problem of concern.

Run off and sediment from the loessial areas have caused damage amounting to more than $500,000 annually. In three of the last 5 years, the cost has run to more than a million dollars annually.

The first preparatory step was taken January 3, 1946, when the Iowa State Soil Conservation Committee called a public hearing at Sioux City. It was attended by land owners, members of the State Committee, representatives of all the Soil Conservation Districts in the watershed, the Extension Service, the Farm Bureau, and the Soil Conservation Service.

Many aspects of the Little Sioux problem were discussed that day. Reports from the surveys indicated that farmers would benefit by $2.06 to $2.52 per acre, for each dollar invested, and that the public would profit by $1.14 to $1.82 per acre on each dollar invested.

NOTE.—The author is George C. Lamp, assistant State conservationist, Soil Conservation Service, Ames, Iowa.

In 1936 Congress enacted the Omnibus Flood Control Bill which gave the Department of Agriculture authority to make investigations of watersheds for "run-off and waterflow retardation and soil erosion prevention in the interest of flood control."

The Department subsequently placed these activities in the hands of the Soil Conservation Service and the Forest Service.

Chairman Earl Elijah appointed a temporary committee which has since become a permanent Works Committee. Each of the 9 soil conservation districts is represented.

The Works Committee requested special assistance from the Iowa Extension Service on a general educational program, and the latter assigned a full-time man to this job. It asked the State Soil Conservation Committee to help in developing contract and agreement forms. Such forms have been perfected and are now in use on the watershed.

The Committee enunciated the following principles:

1. All flood control assistance shall be made available to cooperating parties under a uniform and well-defined procedure.

2. Priorities for assistance will be based on the percentage of land owners within a subwatershed who participate, on the quality of flood control conservation farm plans developed in the area, and on the percentage of plans actually applied to the land.

3. Soil conservation districts will be responsible for making flood control assistance available to individual farmers and other local interests.

4. Each subwatershed will be treated as a unit although it may comprise several smaller watersheds. The effects of such subwatershed treatment will be considered in developing plans for treatment further downstream.

5. Districts will not consider requests for assistance until 70 percent of the land owners in a subwatershed have expressed willingness to participate in waterflow retardation and soil erosion prevention on their farms.

6. The districts will use 15-year agreements in cooperating with private land owners and other local interests.

7. The districts will have responsibility to see that the educational needs are provided to the degree necessary to expedite the work.

Soil Conservation Service assistance made available from flood control funds will be used in planning and installing measures as provided in work plans.

Land owners will contribute cash to a district maintenance fund for 15 years, in accordance with policies developed by the district. The district will administer this fund in maintaining structural works installed for the stabilization of water-disposal systems.

The district supervisors and representatives of the Service will make periodic inspection jointly of the major gully control structures to assure successful operation and consistent maintenance.

Land owners will be directly responsible for maintaining all other land treatment on their properties.

Terrace systems and contouring are part of most flood-control conservation farm plans.

Stream-channel meanders, caused by flood flows, destroy farm lands and develop hazardous situations along railroad and highway rights-of-way.

Railroads and highway departments will provide rights-of-way for flood control installations, pay one-half the cost of installing earth fills, and will be responsible for maintaining the works of improvement located on their properties. All flood control works on such lands will be constructed under the supervision and inspection of the Service, and in conformity with designs developed by the Service.

The districts will be responsible for obtaining easements and rights-of-way for all flood control works they operate and maintain.

Technicians of the Service are responsible to Carl Fritzsche, district conservationist, at Sioux City. Farm planning activities have been speeded by assigning two new farm planners and aides to the Woodbury County Soil Conservation District and one to the Soldier-Maple Valley District. With the assistance of the district governing bodies, the district conservationists determine when the flood control technicians and other assistance may be made available for initiating operations in selected subwatersheds.

The technical group prepares work plans for flood control operations. It also prepares detailed plans for and supervises application of the flood control measures.

By the end of 1946 work plans had been developed for 13 subwatersheds, and detail plans were in progress on 3 of these. At that time farmers had organized 60 subwatershed groups. In 1 work group alone, 259 flood control conservation farm plans had been developed during the year.

Of interest is the progress made by the 28 land owners in one 3,400 acre subwatershed. By January 1, 1946, only 18 had requested and secured district assistance in developing farm conservation plans which embodied provisions for complete water management.

Before the end of the year, however, news of the Little Sioux Watershed program got to them and 9 of the remaining 10 farmers requested district assistance in developing flood control conservation farm plans. The group formed an

organization, appointed a chairman and a committee to look after its interests.

Many district governing bodies have made progress toward developing understandings with local interests with regard to works of improvement needed for flood control. One district has reviewed the work plan for a 400-acre subwatershed with the land owners and the county board of supervisors. Two control structures in the road right-of-way and four on farm lands are required for stabilization of the water-disposal system.

Approximately 17.5 miles of terraces are planned and partially constructed; 25 miles of grass waterways have been planned and 75 percent established; 65 acres have been converted from cropland to pasture and all cropland is farmed on the contour and in rotations recommended in the district work plan. It is estimated that peak flows in this subwatershed will be reduced approximately 60 percent and sediment loads will be reduced as much as 80 percent. This is the first subwatershed to be treated with flood control assistance. Work on structures was to begin shortly after April 1, of this year. These land owners will contribute approximately $1,500 to the district maintenance fund before the construction contracts are let; they will also make annual contributions of about $250 for 15 years. In addition, they will pay for a small percentage of the annual repair costs for structures installed on the farm land in their subwatershed.

All the district commissioners have noted an increase in application of farm land treatments since the flood control program was first announced.

Complete flood control treatment in a few subwatersheds is the immediate job ahead. This will enable the people to see for themselves what can be accomplished through cooperative work.

The soil conservation districts regard subwatershed group organization of land owners as an important step in arousing a sustained interest in soil conservation and in doing a better job of correcting land and water problems. Such an approach, it is felt, will result also in better maintenance.

WHY SOIL CONSERVATION DISTRICTS ARE POPULAR AND SUCCESSFUL IN KENTUCKY

1. *They give service.* They meet the needs of farmers by providing them with expert assistance in protecting and improving their lands, acre by acre.
2. *They are democratic.* They are created, directed and managed by locally selected farm leaders who contribute their time and effort.
3. *They are independent.* They are legal, self-governing subdivisions of government through which local, State, and Federal programs of conservation are being coordinated and carried out.
4. *They stimulate community action.* They are flourishing organizations, participating in a Nation-wide conservation program. Community and watershed problems, such as wasteful despoliation of land and streams, forest and wildlife resources, beyond the reach of individuals, are being solved.
5. *They pay.* They promote increased incomes of cooperating farmers through increased yields, and contribute to improvement of the general health and welfare.

A. THRELKELD,
President, Kentucky Association Soil Conservation District Supervisors.

McARTHUR IS THE "MAN."—The growing importance of soil conservation districts in agriculture has been highlighted by the selection by *Progressive Farmer* of E. C. McArthur of Gaffney, S. C., as the "Man of the Year" in South Carolina agriculture. (See "District Profile" in SOIL CONSERVATION for July 1945.)

McArthur's soil-saving began on his own 165-acre farm and in his own Broad River Soil Conservation District, which he serves as a supervisor. What he did on his own land and in helping his neighbors brought him recognition first as president of the South Carolina Association of District Supervisors, next as president of the Savannah River Soil Conservation Districts Association, and, in 1946, as first president of the National Association of Soil Conservation District Governing Bodies.

Because of the soil conservation treatment of his own land, McArthur now grows 60 bales of cotton on half the land formerly required to make that yield, and other crop yields have jumped in proportion. As a result of the increased feed grown through better land use and rotations, he has added a registered herd of Herefords. Half of his farm income now is derived from livestock.

"At his own expense (because he received no salary either as district supervisor or as president of the state association of supervisors) McArthur has traveled over the South and to national meetings preaching soil conservation with all the fervor of an old-time evangelist," Progressive Farmer's editors said.

Teamwork in TEACHING

By GEORGE S. ROUND

EDUCATIONAL responsibilities of the Extension Service in connection with the development of soil conservation do not cease with the formation of the soil conservation district, says D. E. Hutchinson, Extension soil conservationist, University of Nebraska College of Agriculture. If anything, the responsibilities for maintaining an educational program increase with the acceptance of soil conservation by the local landowners.

The Nebraska educational program calls for the Extension Service to work closely with local supervisors and technicians working with soil

Above we take a look at the workings of the Nemaha County Soil Conservation District, Auburn, Nebr. The educational and informational program for 1947 is being planned right along with the work plan and the development of priorities for field work. Starting at the left, are Lloyd Nichols, supervisor (1946 World Herald contest winner); Homer Matthews, supervisor; Elmer Berg, supervisor, secretary; L. E. Smedley, district conservationist; Fred Allen, supervisor, chairman (standing); C. B. Patrick, work unit conservationist; John Steele, county agent; E. C. Demarest, supervisor.

conservation districts. The Soil Conservation Service recognizes the Extension Service as the agency responsible for dissemination of agricultural information in the State. The Extension Service recognizes the technical responsibilities of the Soil Conservation Service.

These two agencies work as a team. The Soil Conservation Service supplies information relative to soil and water conservation, and the Agricultural Extension Service presents this information to the public through accepted educational and informational media, including newspaper releases, feature stories and radio programs.

The responsibility for the actual organization of soil conservation districts rests with the local people. But the Extension Service undertakes to inform farm people of the need for soil and water conservation. It has the responsibility also of telling landowners how they may help solve the problems of erosion through organization.

The Extension Service assumes responsibility for education both before and after the soil conservation district is formed. Prior to the organization of a soil conservation district, an educational program to inform local people of the benefits conservation will bring to the county is best carried out by having local people set up a county-farmer committee to head up the work. Such committees have functioned successfully in Nebraska.

Getting a complete program of soil and water conservation on the land is a job that falls into two general classes of activity. One is the application of practices which require on-site assistance of technically-trained soil conservationists; the other is that part of soil conservation work which can be accomplished by educational means. The latter job includes paving the way for technical assistance, maintaining practices established by on-site assistance, and creating a desire by the operator for improving his already-established conservation program.

Educational phases of the annual work plan requested of each soil conservation district board of supervisors by the State Soil Conservation Committee are considered of great importance. The State Conservation Committee suggests that the annual work plan be made jointly by district supervisors, the county agricultural agent, and Soil Conservation Service technicians.

NOTE.—The author is Extension Editor, University of Nebraska.

Method demonstrations in which farmers and ranchers are shown how to do many of the soil conservation jobs are a joint soil conservation activity carried on by the Extension Service and the Soil Conservation Service in Nebraska. Usually they are carried on prior to on-site technical assistance furnished by the Soil Conservation Service to individual district cooperators.

The Nebraska Extension Service looks with pride on the leadership its agricultural agents have accepted in assuming the responsibility for assisting in planning these demonstrations and carrying out the publicity in connection with them, and for their guidance to district supervisors or cooperating farmers appointed by them to look after the details and arrangements for the demonstrations of methods. All this prepares the way for Soil Conservation Service technicians to supervise the demonstration of practices and discuss the techniques involved.

At a large demonstration, Extension and Soil Conservation Service technicians are usually present to discuss soils and crops problems. At the smaller meetings the county agricultural agent handles this educational phase.

Method demonstrations have been highly effective in Nebraska. Held right out on the land, with machines and equipment actually in operation, they have a natural attraction for the farmer. Where the crowd is large, a public address system is essential. The county soil conservation district chairman or the county agricultural agent usually is master of ceremonies.

Another joint educational activity is the planning and conduct of tours of soil conservation projects. Here, again, the agricultural agents work closely with soil conservation district supervisors and Soil Conservation Service technicians. The tours usually are to nearby counties where there is work already established. Stops are made at farms showing a complete soil and water conservation program.

Hutchinson declares that there is no substitute for seeing. The success of tours emhpasizes that truth. Tours give farmers an opportunity to see work that is already established and effective.

Although both demonstrations and tours play a big part in the cooperative education, many districts go even further and hold annual conservation meetings for summing up achievements of the past and emphasizing plans for the future. The county extension agent, soil conservation

district supervisors, and Soil Conservation Service technicians work together to prepare an interesting day's program. District supervisors report on the year's accomplishments. Usually specialists from the College of Agriculture are present to discuss phases of agronomy or soils. Some counties hold all-day meetings, others afternoon meetings, still others evening meetings.

The Nebraska soil conservation educational program does not stop with the farmer. Future farmers of the State are reached through the schools. The Nebraska State Department of Education is wholeheartedly behind the teaching of soil and water conservation. The biggest problem is to find school teachers who are suitably trained. A number of county agricultural agents and Soil Conservation Service district conservationists have worked with county superintendents to train rural school teachers in soil conservation. In one Nebraska county, the chairman of the district board of supervisors requested the county superintendent of schools to contact the county agricultural agent and work out a program of conservation education for the county schools. The county agricultural agent called in the district soil conservationist and the Extension Soil Conservationist, and together they worked out a conservation education program which has been successful for that county.

To help soil conservation technicians keep informed of new developments in crops and soils work, and to keep field recommendations consistent, the agronomy department of the College of Agriculture twice annually sponsors a special short training school for technicians assigned to soil conservation districts.

The cooperation between the Soil Conservation Service and Extension Service in Nebraska extends well beyond immediate educational activities. Soil Conservation Service technicians helped the Extension agronomist last fall in determining the corn yields for the Nebraska corn yield contest. The information gathered will be of value to both the Soil Conservation program and the Extension agronomy program.

The Omaha World-Herald "Soil Conservation Recognition Program" is another activity with which the Soil Conservation Service and Extension Service cooperate. It is one of the Nation's outstanding agricultural-recognition projects.

The extension Service and Soil Conservation Service cooperate closely in getting out special soil conservation editions of the World-Herald and of State and county newspapers. Local county agricultural agents and Soil Conservation Service technicians work together in supplying various kinds of news stories on soil conservation to the press.

Where local community conservation meetings are held, the Soil Conservation Service and county agent work side by side to provide the program. The county agent is responsible for publicity and invitations. The Soil Conservation Service technicians assist with the technical discussions of soil and water conservation.

The Extension Service and Soil Conservation Service in Nebraska, with the approval of the State Soil Conservation Committee, worked together to develop a "Guide to Conservation Farming," for two physiographic areas of Nebraska. They have also worked together to develop a circular called "Grass Down Field Waterways." Now they are in the process of developing a number of similar publications, the printing being done by the Extension Service.

The Soil Conservation Service also works closely with the Extension Service in developing soil conservation phases of the Nebraska Farm Unit Planning program. In Nebraska the program is carried on only in areas where farmers are cooperating with soil conservation districts. The soil and moisture conservation plan for the Farm Unit Plan is an important part of farm unit planning, and is the one worked out by Soil Conservation Service technicians with district cooperator.

Hutchinson maintains that the educational phases of soil conservation merit the best thinking and assistance of which the Extension Service is capable. Increased emphasis on soil conservation calls for the Extension Service to do its part in the educational phases. The close cooperation with the districts of the Nebraska Extension Service and the Soil Conservation Service will continue to benefit immeasurably the Nebraska farmer who practices soil conservation.

(*Continued from page 218*)

tion, which was stripped on the contour in 1937, is earning $6 per acre more than before it was stripped. On the steepest portion of the farm we planted various species of pine trees in contour furrows as a water break and soil retainer, which answers the purpose very well. In simple words, I consider soil conservation an asset to my farm."

By July 1947, there will be at least a billion acres of land in organized soil conservation districts.

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100,000 Fight Soil Losses

By G. L. NOBLE

A NEW and potent partner in controlling erosion on farms is the National 4-H Soil Conservation Activity, which was added to the noteworthy list of club projects in 1944. Forty-three States and Puerto Rico accepted the activity and more than 100,000 4-H members throughout the Nation received soil conservation training last year. Present indications are that the participants in 1947 will outnumber those of last year.

The training included, among many other soil conservation activities, contour farming, strip cropping or terracing, making soil tests for limestone, phosphate or potash requirements; establishing permanent pastures, removing wooded lots from grazing, sodding waterways, planting shelter belts and windbreaks; clipping weeds, and improving or building weirs and diversion boxes for irrigation purposes.

As incentives for superior records of achievement, merit awards are offered by the Firestone Tire & Rubber Co. on county, State, sectional and national levels. Awards include 2,948 gold medals for county winners, and United States Savings Bonds for the 6 highest-rating participants in each state amounting to $13,800. In addition, 16 selected State winners receive a sectional award, an educational trip to the National 4-H Club Congress in Chicago. Eight of the sectional winners are chosen for national honors, each receiving a $200 college scholarship. In short, 3,248 participants in the activity have an opportunity to win an award for outstanding work in controlling soil erosion and improving land use.

The activity is arranged by the National Committee on Boys' and Girls' Club Work, and conducted under the direction of the Federal and State Extension Services.

One of the chief objectives of 4-H Club work is to encourage members to "learn by doing." That they are carrying out that objective is evidenced in the 4-H'ers' records, a few of which follow:

George Scott, 19, of Fort Collins, Colo., drafted and launched a comprehensive soil-conservation program on his father's 140-acre farm in Larimer County. Last year he carried this work still further, seeding the banks of irrigation laterals in a large field to grass, cementing a 100-foot ditch, tiling a tract to replace a stream which prevented cultivation of 1½ acres. He also sprayed pastures to control weeds. In addition, he rented and placed under soil conservation a nearby 40-acre farm containing two streams and a river which will be devoted to trout fishing. George did most of the work on the fish hatchery and small ponds, and is building a 750 x 150-foot pond.

Larry Torrance, 17, in partnership with his father, successfully shifted production on their 156-acre farm near Milledgeville, Ga., from cotton to livestock and feed, through erosion control and improved land use practices. Last year 55 acres of pasture were cleared, fertilized and seeded; 29 acres of woodland were fenced, lime, and phosphate were applied where soil tests showed they were needed, and terracing and contour strip cropping were used extensively. Balanced rotations are in effect. Larry also planted and sodded several waterways, and maintained a 1-acre forestry demonstration plot.

Rapid progress in establishing a complete soil conservation plan on his father's 78-acre farm has been effected by S. Douglas Voight, Jr., of Amite, La. Having mapped the farm in detail, Douglas in 1945 laid out and built terraces where they were most badly needed, established a permanent pasture, sowed Austrian winter peas as a cover crop in a large field, and blocked a gully with a log and brush dam. He also spread 15 tons of limestone and 3 tons of phosphate on his home farm, and helped an uncle plot and build terraces on a nearby tract. In addition, he has protected 40 acres of timber by posting "No Smoking" and "Put Out Fire" signs.

Efforts of Roger W. Teater to check soil losses and build up the fertility of his father's 57-acre farm in Jessamine County, near Nicholasville, Ky., proved successful in producing higher crop returns. Last year, as the result of Roger's work, every cultivated field on the farm was

An Illinois 4-H Club member learns some startling facts from run-off plots.

contour strip cropped and later planted in cover crops of vetch and rye, with an 8-year rotation plan in effect. He was host with his father at a soil conservation demonstration in which a ditch was dynamited to drain two small fields last spring, providing an outlet to a small stream. During the summer he clipped 26 acres of pasture to control weeds. Roger's plans include terracing 15 acres to be used as a permanent pasture and building a cement trough at a spring on the tract.

Willie Rae Howe, 19, with his younger brother helps his widowed mother operate a 264-acre farm near Whelling in Livingston County, Mo. Last year Willie seeded a grass waterway in a 20-acre field preparatory to terracing, and completed a water management plan for an additional 80 acres. He limed 150 acres, and applied 10 tons of fertilizer on the farm each year for the last 2 years. He is also carrying out a fertilizer demonstration project in cooperation with the county farm adviser.

Impressed by the heavy losses of soil by erosion on his family's five farms, Robert N. Mason, 20, of Ontario, N. Y., last year began an extensive soil conservation program, using a 97-acre tract near his home as a model. One large field was drilled to wheat on the contour and another strip cropped. To drain two muck fields, 4,300 feet of ditches will be evacuated; 1,200 feet of drainage tile will be placed in a third field. A number of diversion ditches also will be dug. Two other tracts will be merged for strip cropping, and the farm woodlot will be enlarged and fenced.

With his father, Howard B. Goodnow, 15, of West Swanzey, N. H., dismantled 100 feet of stone wall, carried away the rocks, and changed the course of a stream by building a sod dam and cutting a new channel. A large field was drained by blasting a ditch, which was done by employees of the United States Soil Conservation Service. Howard also cleared underbrush from a ¾ acre of land, which is being seeded, and with his brother applied poultry manure to a pasture.

Robert C. de Baca, 16, of Newkirk, N. Mex., who completed his third year of conservation work in 1946, placed 510 acres of his father's 2,400-acre ranch under deferred grazing, seeded 50 acres to Johnson grass, applied manure to 40 acres and terraced two smaller fields. He also built three gully headcut structures of rock and brush in pastures, constructed a gully plug and placed brush and rock spreaders in two fields.

After 3 years of work, Eugene Róss, 16, is approaching his goal of making his father's 80-acre farm at Warner, Okla., a model of improved

William M. Abbott, a state soil conservation winner, toured his state to learn as much as he could about soil conservation practices. He came to the conclusion that "it is fortunate that there is as much top soil left as there is, even though there is very little in most places."

land use. With his father, Eugene terraced and contour planted cropland and pastures, and used recommended pasture mixtures of lespedeza, Bermuda and rye grass. A permanent woodlot was fenced off for timber production and game protection. A dam was built to provide water for livestock, and the main waterway on the farm was planted to grass.

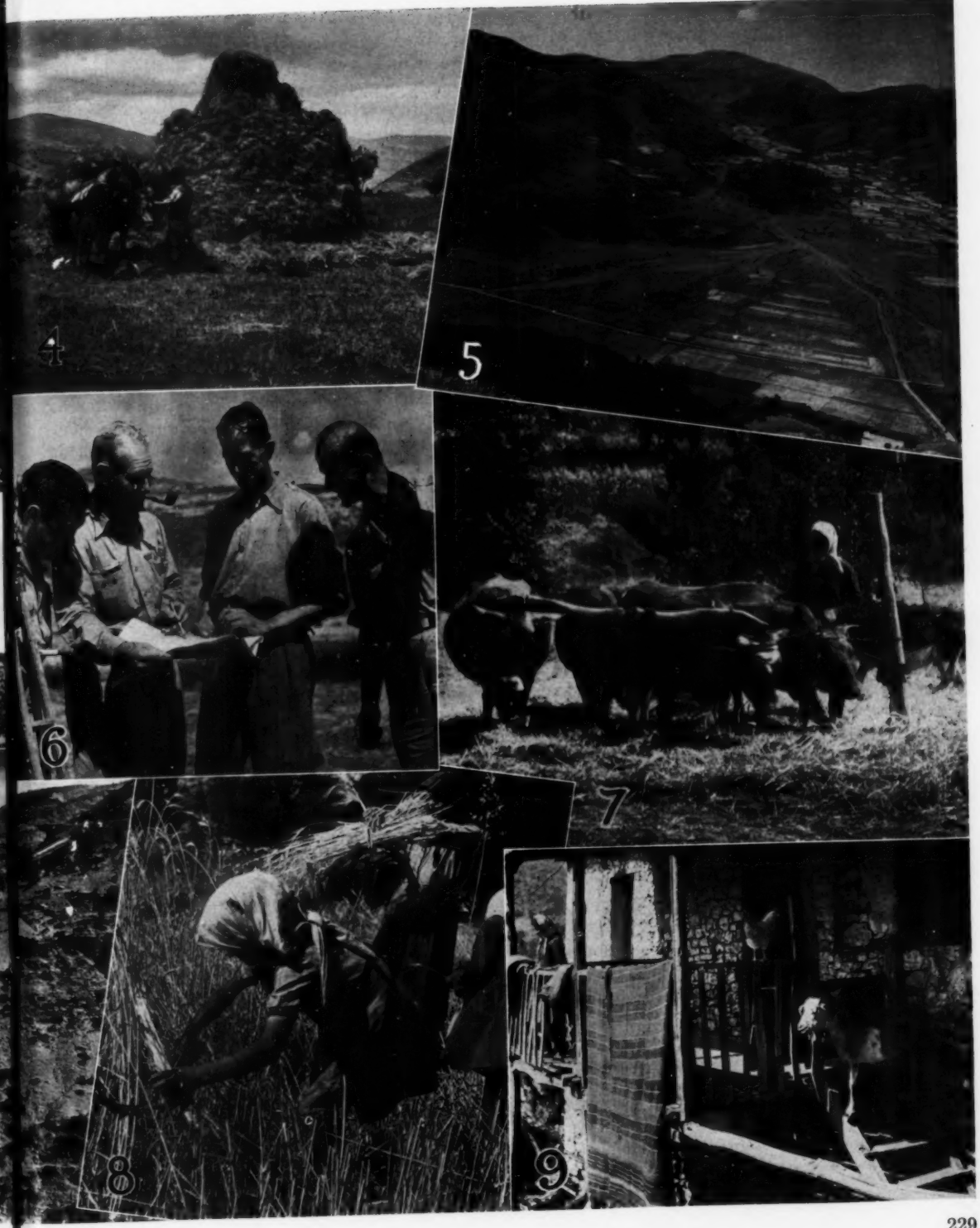
Conservation plans were prepared on 127,000 farms and ranches in districts during 1946, with the assistance of SCS technicians. These new plans contained over 33,500,000 acres. Complete treatment was carried out by farmers and ranchers on about 19,000,000 acres in the one year.

At the end of 1946 there were 424,372 active conservation plans, comprising 116,646,256 acres in districts. Treatments as planned had been carried out on about 57,140,426 acres.

GREECE Looks Ahead

By F. G. RENNER
Chief, Range Division, Soil Conservation Service

Explanation on Following Pages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SHORTLY after the end of the war, the Greek Government turned to the United Nations Relief and Rehabilitation Administration for help in improving Greek agriculture. It was recognized that the mountain villages had never been able to make more than a scanty living; that both mountain pastures and valley lands were seriously eroded, forests badly depleted, and additional irrigation and drainage urgently needed. Ministry officials had come to appreciate, too, that unless these basic causes of low agricultural production could be corrected, the extreme poverty among rural people would continue indefinitely. It was evident that any attempt to rehabilitate Greek agriculture would have to give major attention to conservation of the soil.

ACCORDINGLY, UNRRA was asked to provide the services of a group of scientists, to make a survey of conservation problems, and to develop specific plans for the improvement of conditions on a number of areas. It was expected the findings of such a survey would serve both as a basis for an immediate program of action and as a foundation for similar conservation projects in other parts of Greece, particularly in the mountainous sections.

After examining a number of areas, the Vouraikos drainage was selected as the first to be studied. Originally the mountainous area of this watershed, like much of Greece, had been forested with fir at the higher elevations and holly oak on the lower slopes. Many centuries of heavy population have brought vast changes in both the appearance and character of the original forest. Much of the mountainous area has been cleared and used to grow wheat. Many of the steeper slopes have eroded so badly that they have been abandoned for cultivation and are again slowly reverting to oak brush. The grazing of the area for centuries by sheep and goats has also changed both the vegetation and the land. With the exception of a few small areas, the original oak forest no longer exists. It has been reduced to brush, a foot or two in height. Many trees and shrubby species that were probably once abundant have been almost eliminated by centuries of overuse.

Soil erosion, resulting from heavy grazing and unwise farming practices has seriously damaged much of the agricultural land, even on moderate slopes. During flood periods, which occur nearly every winter, a great deal of surface soil is removed from the steeper slopes. With it goes much coarse cobble and gravel. Most of this erosion debris is deposited in cone-shaped fans in the valley. These fans have blocked the main stream channels and transformed much of the fertile meadow land into swamps, thus further reducing the available agricultural land. The finer sediment is spread over the entire valley floor or carried down the main river to the sea. Most of the soils are poorly developed and low in organic matter because of this continuous erosion and deposition.

Like many older agricultural areas of the world, the region is densely populated, with far more people than its depleted natural resources can adequately support. In this particular watershed nearly 10,000 people are attempting to support themselves on 62,000 acres, most of these acres eroded, some of them waterlogged, and all of them reduced in productivity.

The present types of farming operations are far from conducive to protection of the soil resources. The average family owns or rents 1.5 acres of irrigated land, 8 acres of dry-farming land, 24 acres of mountainside grazing land, and 5 acres of mountain forest. The lower natural terraces are in grapes, or where irrigation is possible some of them may be in corn, with wheat in alternate years. Many of the steep slopes of the mountains themselves are in wheat, which too often extends over fair soils and poor to the highest summits.

In spite of the large number of domestic animals, particularly goats and sheep, there is almost no livestock industry as an enterprise separate and distinct from farming. In most cases, the livestock are owned in small numbers, each family having from one to four head of goats, a like number of sheep, and a donkey and an ox for draft and transportation. These animals are essentially members of the Greek farmer's family. They accompany him to the fields in the early morning, stay with him all day, and return with him to the village at dark or after, to share the same roof.

In Greece, as elsewhere, land and its use is reflected in the living conditions of the people who depend on it for their livelihood. Destruction of the land resources and the accompanying poverty has reached the point where most of the families

NOTE.—With the author on this mission were Grover Kinzy, agronomist; J. E. Flanagan, irrigation and drainage engineer; M. B. Dickerman, forester; Claude L. Fly, soil scientist; and Ch. Panayiotides, agriculturist from the Greece Ministry of Agriculture.

in the area studied have little or no money even for the purchase of necessities. Education, recreation, and cultural pursuits are almost beyond their reach. To maintain a bare existence, more and more land has been cultivated, much of it not adapted to farming. For the good of both land and people far too much land has been used for wheat and too little for fruits, vegetables and improved pasture to produce livestock products for family use.

Primitive methods of cultivation require long hours of hard labor in the fields. Much of it is performed by the women and children who also have to take care of such usual household duties as cooking, spinning, and weaving. These are particularly laborious because of the lack of such ordinary conveniences as running water, cooking utensils, and lights. Only the crudest equipment is normally available. Bread is baked in an outdoor oven, but most other foods are prepared in a pan over an open fire. Because of the drudgery and time involved, the Greek peasant family usually has only one hot meal per day, and one cooked dish per meal.

In spite of the depleted condition of the land and the poverty-ridden condition of the people, the survey indicated astonishing improvements could be brought about within a short period, with relatively little effort. It was found, for example, that the irrigated land in the watershed could be increased 55 percent by a simple drainage system that would reclaim lands now too wet to cultivate. An additional 23 percent of new lands were found suitable for irrigation farming. This makes a possible increase in irrigated land of 78 percent. Such lands, of course, would be the most productive in the watershed. Acre for acre they should produce several times as much as the eroded, dry-land slopes.

The area available for dry-land farming could also be nearly doubled by replacing the every-other-year fallow system with continuous cropping. Without means to keep down the thistles and other weeds, the present system is of little benefit. If the proper changes in land use were made, many of the steeper eroding slopes would go back to brush; and still the area available for crops each year would be greatly increased.

Forage supplies could be increased tremendously. The yield of corn, 80 percent of which is fed to livestock, could probably be quadrupled by the introduction of modern hybrid varieties in place of the ancient short-eared, 8-rowed flint type now grown. Alfalfa, wild peas, white, yellow, bur and sweet clover and vetch grow wild in the area; but aside from a few patches of alfalfa, very little use is made of any of these valuable legumes. The planting of some of these legumes with Italian ryegrass in the standing corn in August or immediately after harvest should greatly increase green pasturage from November to late April. This would also prevent much of the erosion of these lands during the period they are now bare. Where corn and wheat are alternated, planting sweetclover and ryegrass in the wheat should provide a green-manure crop and increase the pasturage from July to late April.

Greek sheep produce less than two and a half pounds of wool and about 50 quarts of milk annually; while the clip from the goats is less than three-quarters of a pound and the milk production about 60 quarts. The amounts of milk, wool, and meat produced could easily be doubled, even after the numbers were reduced to the capacity of the land. This could be done by improving the quality

(*Continued on page 236*)

CENTER SPREAD

0. The Greeks have used crude brush and rock terraces since ancient times. Few are well maintained and many are on slopes too steep for permanent cultivation.

1. The forest of the Monastery of Ayios Lavra which has been protected from fire and excessive grazing since the monastery was founded about 900 A. D. Much of the mountainous area of Greece probably once looked like this.

2. In contrast to the monastery forests, much of the mountainous area of Greece now looks like these denuded and eroding hillsides. Faint remnants of rock and brush terraces indicate the slope to the left was once in cultivation.

3. A fallow field with its usual cover of thistles. With ample rainfall from October to June, a fallow system is unnecessary and production could be doubled if wheat were grown each year with winter annual legumes and fertilized.

4. Areas too wet for cultivation produce swamp-grass which is cut, bundled, cured, and hauled several miles to the village for winter feeding. If such areas were drained they would grow excellent alfalfa or pasture to relieve the overgrazed brush-covered slopes.

5. Much of the best farm land in the valley bottom of the Vouraikos has been covered by such fan-shaped cones of rock and sand washed down from the upper slopes.

6. The author, together with the engineer and interpreter of the mission, explaining the proposed drainage system to the president of the village of Kertezi.

7. Due to the small size of their land holdings, each family laboriously threshes its own wheat with slow-moving oxen or donkeys.

8. Women and children do much of the farm work. The wheat is cut with a hand sickle and tied in bundles to be hauled to the village on the back of a donkey.

9. Centuries of land impoverishment are reflected in the living conditions of the people. The houses of the Greek farmer are of stone but few have lights, heat, or running water or anything but the barest of furnishings. The chickens, goats, and donkeys occupy the ground floor.

CREDIT for Soil Conservation

By E. C. WEITZELL

CREDIT for financing the application of soil conservation measures and practices is a comparatively new type of investment. Although investments in farm and forest lands usually have been based on the concept of permanent or perpetual incomes, the idea of "additional" investments to insure the assumed permanency of land value is new to most potential creditors. Short-term loans for seed, fertilizer and other production supplies are common practices in most farming areas. The difference between production credit and loans for conservation is one of emphasis only. Whereas production credit usually is for a single production cycle, the objective of conservation is to maintain a desired level of productivity over a long period; and if adequate maintenance is provided, the benefits should accrue in perpetuity.

THE need for capital investment and reinvestment for soil conservation arises out of past neglect and failure to expend currently for maintaining soil resources. The accumulation of these deficits makes it necessary to reinvest to the extent that it is desirable and economical for rehabilitating productivity. In addition, certain measures and practices are required to protect and conserve farm lands when they are removed from nature's protective custody and submitted to uses which may result in depletion and erosion if essential conservation measures are not provided.

The amount of cash required for installing a program of conservation farming may vary considerably. In some areas conservation may consist of practices and simple measures that farmers can apply, if they are provided with adequate technical assistance. In other areas, and especially on those farms that have been allowed to erode and deteriorate severely, conservation may require comparatively expensive measures and practices. Labor and machine work, together with materials for masonry installations, tree plantings, protective fencing, and fertility improvement, may involve substantial cash outlays. To the extent that cash is required, suitable credit may be a desirable facility for supplementing the capital that farmers may be able to provide from savings and current earnings.

Another need for credit may arise in those instances where the enterprises or systems of farming must be changed in behalf of soil conservation. It may be that cash crops are partially replaced by pasture and sod crops, resulting in a need for enlarging or initially establishing livestock enterprises in order to make the conservation system of farming work. Some farms are too small to be able to follow the type of farming that would permit conservation. It may be that land could be obtained for enlargement, and the provision of economic operating units, if credit is available under acceptable terms. Well-planned credit for these purposes may be of greater value in some instances than investments in certain mechanical measures for controlling erosion. The elimination of the cause of depletion should precede the treatment of "ill" land. A reasonable degree of operating economy, and land use adjustment are essential to the feasibility of conservation farming. Because adjustments in the operating units may be an essential requisite to the success of conservation programs, it may be desirable to make joint loans for the two purposes.

The intelligent provision of credit for soil conservation depends on four basic conditions: (1) The character of the program to be installed;

NOTE.—The author is an agricultural economist, Bureau of Agricultural Economics, Washington, D. C.

(2) an adequate appraisal of the benefits to be derived from soil conservation; (3) the availability of loan capital at rates of interest and repayment terms consistent with the amount of benefit that may be expected and the time-pattern of their occurrence; and (4) the possibility of acceptable security for guaranteeing repayment.

In the first place, any program of soil and water conservation to be financed by private investors and creditors must make a contribution to the economy of land use and farm operation at least equivalent to the accepted earning standards for private loan capital. This means that those features of any program which are designed to produce benefits of a "social" nature should not be included in private financing plans. Measures of this character include those from which the benefits accrue to the general public, or during periods of time beyond the scope of existing interests. These limitations do not imply that investments beyond the realm of existing private interests may not be desirable. However, the cost of social improvements should be financed by public subsidies or other types of puolic investment. In those cases where social or public values are inseparably tied up with the achievement of private benefits, the investment necessarily may be a joint responsibility.

Private investments for soil and water conservation must be justified by (a) resulting increases in expected future incomes, or (b) the prevention of reductions in future incomes. To determine whether any suggested program will produce increases in future incomes adequate for justifying the investment demands that the expected benefits be estimated within a reasonable margin of error.

It will bear pointing out that data indicating the probable benefits that may be expected from any specific combination of practices applied to a particular kind of land is fragmentary and incomplete at best. And for most land conditions the available information is entirely inadequate for appraisal purposes. The compilation and economic interpretation of experimental and practice data, as guides to cost-benefit appraisals, will be invaluable to the development of sound investment and credit programs for financing soil conservation. Adequate cost-benefit appraisals will require basic data indicating the amount of net benefits that may be expected, and the time-pattern of their accrual, including the relative permanency of the improvement in terms of maintenance and replacement costs. Without going into detail concerning the appraisal analyses, it will be well to discuss a few of the points involved.

First, it is essential that the conservation investment be planned so as to maximize the resulting net benefits. Second, in order that the net benefits may be capitalized as the value of conservation, adequate allowances must be made as returns to labor, management and other associated factors. Third, it is necessary to discount the series of infinite or terminal annual net benefits in order to eliminate the factor of risk, and to convert values extending over a period of time to "present value". The present value of the expected net benefits is a measure of the amount of security that is expected to be available, as a basis for conservation investments.

The planning of a soil conservation loan for any specific farm involves detailed analyses of the entire farm business. The basic point to keep in mind is that the planning of this type of credit must be based on the total ability of the farm business to meet the obligation. Justification for the investment is limited to expected net benefits from conservation. But since farm income accrues as a composite of a number of factors, and is used for the most urgent purposes, it is obvious that credit obligations must depend on the repayment capacity of the entire farm unit.

In this connection the potential creditor will be interested in ascertaining that the farm is adaptable to reasonably efficient operation, and that it is likely to be operated accordingly. Creditors also will be concerned about the financial status of the farmer and his business, in relation to the expected returns from conservation. It should be observed that if prior income obligations will exceed the total income that may be expected with conservation, additional credit may not be feasible. Thus, the debt repayment ability of the farmer is the first order of importance in any credit consideration.

In evaluating the feasibility of credit as a financial aid to conservation, farmers will always be concerned about the annual "cost" of a proposed investment. In other words, they want to know how much cash will be required annually to pay off the credit obligation. The repayment schedule is important from several standpoints. (a) In terms of total farm income and previous obligations the farmer must determine his relative ability to handle additional credit; (b) it is desir-

able to accept credit obligations only on the basis that they can be repaid during the life of the improvement, and (c) it is desirable to plan the repayment schedule in conformity with the flow of expected benefits from the improvement, unless other unobligated funds are available.

As a basis for considering these points, the proposed loan may be projected as an amortized repayment schedule. For example, it may be assumed that a specified program of soil conservation will require investment credit in the amount of $4,000; and that it is desirable to make the total loan available in three installments as the funds are required: $2,000 for the first year, and $1,000 for each of the following 2 years. Interest will accrue at the rate of four percent from the time each portion of the total is released, but amortization will not commence until the fourth year.

It is determined that a 20-year period is a suitable and acceptable loan period, and the money is available at an interest rate of four percent. To amortize this obligation over the 20-year period, beginning with the fourth year after the initial amount is made available, will require the repayment of 20 equal annual installments, including interest and capital. Thus, the annual payments will be $294.33, plus $27.32 for amortizing the accumulated compound interest on the funds advanced during the three years prior to the time repayments begin. The total annual requirement for loan service would be $321.65. It is obvious that the requirement for any specific loan value will vary, depending on the rate of interest, the length of the repayment period, and the arrangements for advancing funds prior to the start of repayment. Of course, repayment schedules need not be annual, and they may be variable The amortized plan indicated above is only an example for portraying the considerations that must be taken into account.

It may be well to observe that the assumed $4,000 loan is not meant to be typical. This amount may be low for farms in some localities and high for those of other characteristics. In any event, to the extent that farmers are able to pay cash, or to install conservation measures and practices by using available family labor the necessity for credit will be reduced.

The available instruments of security for conservation loans are familiar to most farmers and investors. Investments for soil conservation are investments in land; consequently the income from land must be the security. In this respect mortgages for securing conservation loans do not differ basically from any other real estate mortgage; and they may be more desirable in that the maintenance of the security is a major objective.

In most instances credit for conservation is likely to require intermediate to medium long-term security. This means that a first or junior mortgage on the land to be improved or conserved is the most acceptable type of security, where short-term unsecured credit is not available or adequate. If loans for conservation purposes accompany initial mortgages, or if the land is not otherwise encumbered, they may be included in the first mortgage without difficulty.

Short-term credit for lime and fertilizer is more or less customary, but long-term credit for these and other elements that constitute a program of conservation is not likely to be popular until adequate cost-benefit information is made available for justifying the latter procedure.

Insofar as the desirable length of the loan period is concerned, only one stable rule can be advanced. If the value of any improvement is limited to a certain number of years, all outstanding debt against it should be paid off during the productive life of the improvement. Beyond this, the selection of desirable loan periods is dependent on judgment decisions relative to the availability of repayment money, the degree of risk involved, alternative investment opportunities, and other related factors.

From the standpoint of the farmer-borrower there are some factors in favor of rapid repayment, while others may favor long-term credit. For example, long repayment terms add to the net cost of credit, unless farmers are able to offset interest costs by investments of similar or greater earning capacity. Many farmers may not recognize alternative investment opportunities even though they may exist right on the farm; consequently they lack the facility to offset obligated interest. However, to the extent that farmers are able to invest available funds, it may be desirable to delay loan repayment in order to take advantage of current investment opportunities.

Insofar as the creditor is concerned, greater length to the loan period may add to the risk involved, unless there is assurance that the improvements will be maintained and that their estimated earning capacity is perpetual. If risk

is not a factor, creditors may favor long-term investments in order reduce reloaning costs.

In general, repayment schedules should conform to the expected pattern of benefit accrual, which may vary widely depending on the type of measure employed. In other words, credit plans should anticipate a pattern of additional income to result from conservation from which the debt may be liquidated. Otherwise, repayment of debt should be planned so as to prevent the overburdening of current incomes, part of which may be needed for maintenance and other variable farm costs. And unless there is some advantage to be gained the time should not be prolonged more than necessary. Variable repayment plans, depending on the availability of income may be a decided encouragement to credit investments for conservation.

The job of conservation does not end with the initial installation of a system of measures and practices. This program must be maintained, if credit can be advanced safely; and our discussion here assumes that the expected net incomes from conservation, on which credit plans are based, are over and above all costs, including that of maintenance. But what reasonable guarantee does the creditor have that careless farmers may not neglect the conservation program, and permit the loan security to "waste away" as time goes on?

Two angles of this question are important. *First* the loan security must be protected. *Second*, if public credit agencies provide various inducements in the form of low interest rates for example, they have a right to expect a reasonable level of conservation, even though the farmer might be inclined to exploit his land while repaying the loan.

Two or three procedures may increase the probability of maintenance. More intensive education relative to the values of conservation practices over time should reduce the risk of failure to maintain soil conservation measures and practices. For those farmers who recognize and follow the economic aims of good management this should be no problem. But poor management is always prevalent, and it must be recognized as a risk.

Technical supervision and assistance for soil conservation credit clients would not be far different from the supervision provided to service rehabilitation and tenant-purchase loans under existing government credit programs. Under the Soil Conservation district type of organization or as a function of any credit institution, supervision would seem to be a reasonable possibility. Two purposes might be served. Considerable encouragement and aid might be provided to farmers in behalf of achieving conservation, while the financial interests of the creditor were being adequately supervised.

A third and more drastic procedure might be followed. Legal instruments might be employed to insure maintenance, at least while debt contracts remain in force. An acceleration of debt repayment clause might be included in the mortgage contract, stipulating that in default of adequate maintenance of soil conservation the mortgagee may elect to declare the whole principal sum due immediately. Of course, adequate notice to the mortgagor and adequate opportunity for rectifying the default would be necessary. Injunctive action to restrain the wasting away of basic security is another legal procedure that might be followed. Past experience in employing this type of injunctive action has indicated two major limitations. (a) Accepted definitions of waste have not been sufficiently comprehensive. (b) And courts may be reluctant to enjoin waste, except the security is in danger of impairment. The first limitation may be corrected by including in the mortgage contract an explicit definition of waste. Such a definition should include both overt acts of commission, as well as negligently permitting the deterioration of soil conservation improvements. The second limitation could be overcome by specifically conferring on the mortgagee the right to injunctive relief on the occurrence of "waste" as defined in the agreement.

The extension of credit under favorable terms, would tend to speed the application of soil conservation measures. This procedure often may be more expensive than if the program were to be established more slowly, with greater attention given to the employment of natural processes for rehabilitating land resources; and by utilizing farm labor during "slack" seasons for building terraces and other measures. This is not to say that immediate and more costly application would not pay—depending on the relation between costs and earnings. When farmers face rising prices or stable markets, assuming costs to be constant, the benefits from conservation should be maximized by immediate installation. But if the future promises a sharply declining market for farm

products it may be well to encourage reductions in farm debt, rather than increases; and to enlist the forces of nature, available savings, and farm labor for establishing programs of conservation. It is quite certain that debt is more often conducive to exploitation than to conservation during depression periods.

Farmers might well consider their land as part of their banking facilities. During periods of favorable cost-price relationships their savings might be invested in the improvement and repair of their land. Then, during unfavorable income periods, they might draw on these savings, to the extent that they may be replaced. Where savings are not available, farmers may find that credit is their only recourse to achieving a continuing level of productivity and a reasonable return to labor and management. It is a common mistake for farmers to 'suffer along" with a depleted and erosion ridden farm, because of their personal desire to avoid credit. They need to realize that just as machinery and other capital investment works for them, soundly planned credit may be economically employed to assist them in the rehabilitation and conservation of the soil and the attainment of higher incomes.

GREECE LOOKS AHEAD

(*Continued from page 231*)

of the sheep and goats through the introduction of better sires and by making greater use of improved irrigated pastures instead of depending on the brush-covered mountain slopes for forage.

Altogether, over 50 specific recommendations were made to the Greek Minister of Agriculture. Descriptions of methods, plans, engineering designs, and specifications for improving the condition of the land and the people were included in the recommendations. If action is taken on only the major suggestions of the survey, agricultural production in the area can be doubled if not quadrupled within five years. If this improvement were to be extended to other areas where it is needed, it would materially raise the living standards of the Greek people, do much to bring about financial stability in the government, and might well be a material factor in insuring future peace in that part of the world.

REVIEWS

THE FURROW AND US. By Walter Thomas Jack. Dorrance & Company, Inc. Philadelphia, Pa., 1946. 158 pp.

"My place is under the Iowa skies, floored with the world's best soil and walled in by the emerald sky-line of native oaks," so writes Walter Thomas Jack in *The Furrow and Us*.

This book, I think, must be read with this man's robust soil in mind. Applied to agriculture generally, it lacks "geographical intelligence," a lack which always perturbed the late William Allen White, Emporia, Kans., about so many books written on American agriculture. Very few of our 6 million farmers live on soil as rewarding as that found in Iowa, the home of Mr. Jack.

A note on the jacket says "*The Furrow and Us* is the answer to *Plowman's Folly*. Man started with surface tillage for crop production but he abandoned it for the moldboard plow. *The Furrow and Us* is a recital of the practical and scientific reasons for making a quick return to the earth of all residues."

This book is not written by one who has recently discovered agriculture and then sets out to amaze the world with his findings. Here are a few paragraphs that should dispel any notion that Thomas Jack has not been up against the hard realities experienced by most midwest farmers during the last 30 years.

"The writer, back in 1917, embarked on an agricultural career as a life work and, on a fertile Iowa farm, soon found that the farm was the battle ground between man and nature.

"The going was good during the lush war years and the few succeeding years put no tax on personal ingenuity, for prices were good and if yields faltered and fluctuated somewhat, the gap between actual yields and maximum yields was spanned by high prices. There seemed to be no need for worry; old methods of doing things seemed quite adequate and the complications of the chemical nature of the soil seemed to be of no immediate concern. The soil had always responded to our call and whatever force kept it producing, the past years would surely keep production at normal levels.

"When the war clouds of World War I finally cleared, this writer like many other young farmers was not ready to meet the challenge of the wearing soil and falling prices. Soon the black clouds of economic disparity loomed up from every horizon, stealthily boring in, gaining momentum until it peeled the shirts from our backs and swallowed up the savings of millions. Many farmers who had purchased a farm, using up their lush-time savings as a down payment, were forced to relinquish and their savings only served to add more to the unearned increment of the previous owner. Some of us held on through pride and an unwillingness to accept defeat, and we did the only thing we could to meet a fixed expense-increase production. This, of course, was the wrong thing to do, since agricultural surpluses were already plaguing Washington, but if the normal acreage of grain crops and the usual livestock numbers would not meet current expenses, increase in production was the only way out.

"I had noticed that the soil stayed wetter in the spring; the water would run off the gentle slopes or stand in puddles on the level ground. It just couldn't soak into the ground. I was not aware that my shallow tillage methods had created a hard, impervious soil that would not store up moisture. I had not inquired into the reason why my corn fired sooner in hot weather. I was not concerned with the gullies that were cut, even on gentle slopes, and instead of sodding them I performed the usual predatory operation of plowing them in, increasing the valley in width and loosing the tons of precious top-soil.

"I had looked upon myself as an ordinary farmer, and this esteem was not surprising, for I had always kept abreast of seasonal jobs, and many times, before the advent of the tractor, had prepared the ground, planted and cultivated one hundred acres of corn without help. This was exclusive of the small grain and hay crops.

"There is little wonder then, that I had but little energy left for serious thought of the teeming universe in the earth that was ready and willing to work for me if given the chance. Nor of the vital natural laws, of which I knew but little.

"The force of circumstances was to change all this. I found that a few moments of the day spent in observing natural phenomena and a few moments in the evening reading the experiences of others, became an interesting and profitable habit. It gave me a sense of security and freedom from worry, for after all, worry is the result of inefficiency.

"When you walk through your fields, reach down and grasp a hand-full of soil. Is it as dark in color as it used to be? Examine it closely and see if you can observe undecayed pieces of stalks or other small particles of organic material? Maybe you have replaced it and if you have, don't charge up the declining yields to luck or old mother earth."

Of course it is too early to tell how qualified scientists will evaluate this work. My guess is that most of them will be impressed with the author's grasp of the underlying basic principles involved in keeping a soil permanently productive. Perhaps some will disagree with some of his conclusions but most of them, I believe, will heartily agree that here is a working farmer who senses the full significance of the soil and what it means to all of us.

As to the recent controversy to plow or not to plow—that is, with a moldboard plow—I hardly feel that anything has been settled. It would be wonderful if we could dispense with the moldboard plow, for plowing requires far more power than any other job on the farm. At the moment we have no solution to the corn borer problem, other than to completely cover (or destroy) all infected crop remnants. And it is not clear yet how a farmer will be able to handle the weed problem in an intertilled crop during a rainy season if all crop residues remain on or near the surface.

Until we find solutions to these, and other, problems it is quite certain that the moldboard plow will continue in use. On the other hand, it seems equally certain that the practice of keeping crop residues on or near the surface of the land is feasible and practicable on far larger areas of cultivated land than are now being farmed under this system.—GLENN K. RULE.

DROUGHT *ITS CAUSES AND EFFECTS.* By IVAN RAY TANNEHILL. PRINCETON UNIVERSITY PRESS, PRINCETON, N. J., 1947. 264 PP. ILLUSTRATED.

Climatology, which includes drought, is now in a stage during which a store of seemingly unrelated facts is being accumulated. The history of other sciences shows that eventually a point is reached when someone decides to suggest possible cause and effect relationships. This book may well prove to be one of the first steps to lead to the discovery of the laws of nature that govern not only droughts, but other climatic and weather phenomena. The author recognizes and repeatedly emphasizes the inadequacy of available information.

He calls the present approach to the study of climate the "classical point of view." He proposes in its stead what he labels the "objective point of view." This new point of view includes nearly everything that goes with the classical view. But, in addition, the objective view "demands variations in solar radiation." In this view, "climate is as changeable as weather" and "the basic controls of climate also control the weather." The most fundamental of all controls are: variations in solar energy; thermal properties of land masses, of bodies of water, and of the atmosphere; and movements of the atmosphere and ocean currents, induced by unequal heating of various portions of the globe (equator and poles) and modified by the rotation of the earth and by irregularities of the earth's surface (mountain ranges).

The author emphasizes the importance of the relative temperatures of oceans and continents. The dominant role of the Pacific Ocean in molding the climate and weather of the United States is strongly emphasized, ". . . we may strongly suspect that the Pacific Ocean is the monster in the back yard which seems to control our national rainfall, exerting a power that is second only to the sun itself . . ." The expansion and contraction of the Pacific "high" along the west coast, combined with the "sink" over Alaska and Canada, are the primary factors which determine whether the part of the United States *east of the Rockies* gets more or less than normal precipitation. The Atlantic and Medican Gulf are the sources of moisture, but whether and where this moisture is precipitated in the United States depends on the movement of cold air from the "sink." Causes for regional variations are traced to more specific manifestation of the all-important control—the Pacific.

The author's conclusions are that ". . . while the Pacific largely controls the amount of rain which is precipitated over the United States, the Atlantic controls to some degrees the distribution of the rainfall," and that "high sun and cool water make droughts on the border of the continent and low sun and warm waters make droughts in the interior." He analyzes variations in solar radiation, specifically, sunspots, and shows their relation to droughts and climate. Records obtained within the last century and geologic evidence are used to show that long-time variations in climate are determined by long-time variations in solar radiation.

One somehow gets a feeling that the author's case might have been stronger if less emphasis were placed on proving the various detailed conclusions. It would have, perhaps, been better to leave the proof to others. The value of the book is not so much in proving anything, but in postulating hypotheses to be proven or disproven by adequate facts collected with these hypotheses in mind. In the light of the recently acquired information, the "objective" view, outlined in this book, does not seem nearly so "preposterous" as it might have appeared a generation ago.

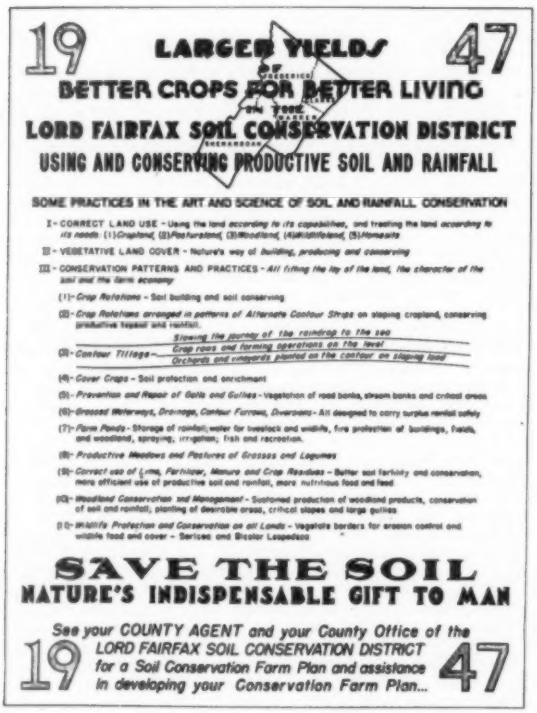
Anyone, who expects to find in this book simple, definite answers to such questions as "when and where will the next drought occur?" or whether and how drought, can be controlled, will be badly disappointed. The author's "objective" point of view does, however, lead him to some profound conclusions regarding the influence of man's activities on climate. He says, "Our climate has changed greatly as a result of clearing the land for crop farming, highways, pasturage and other purposes . . . we can see that any tendency toward an increase in the temperature contrast between continent and ocean in the spring and early summer months will deprive us of rainfall at the very time of year when it is most important to agriculture. . . . If all the vegetative cover were removed from the United States, there would undoubtedly be a remarkable change of climate . . . 'Hot winds of the plains' would dominate the weather in the interior, and the moist winds of the Atlantic and Gulf would be turned to the north and northeast with deficient precipitation even in eastern areas. Hot sun and cool water would produce spring droughts even in coastal areas . . . Floods would become more frequent and disastrous in autumn and winter. In general, our climate seems to have tended in this direction in the last half century." These statements, which may be hotly contested by some, echo the assertion of W. I. Vernadsky (see "The Biosphere and Noosphere," *American Scientist*, Vol. 33, No. 1, January 1945, pp. 1–12) that man is becoming a large scale geological force.

Man's conscious efforts to control climate have so far been limited to minute portions of the atmosphere. The author hints at much broader efforts, but warns that ". . . when and if we succeed in controlling the climate in more than a local and limited degree, we will need broad and

effective regulatory measures to make sure that changes which are advantageous in one area will not be allowed to produce disasters in other areas."

This book, in the opinion of this reviewer, carries two important messages. One of them is intended to make the laymen appreciate the importance of continuing and expanding certain meteorological observations (temperature of the Pacific Ocean, conditions of the upper atmosphere, solar radiation and the like).

The other message of equal, if not greater, importance is intended to get the meteorologist, climatologist, and scientists in related fields critically to reexamine the present approach in the light of recently acquired knowledge. If this message is heeded, we may eventually be able to understand ". . . how the 'sun can pick out South Carolina' and cause a drought in that State while some adjoining areas might have normal rainfall." It is, perhaps, to be regretted that the author combined the two messages in one book. As it stands, this is definitely not a book for the layman. The obvious attempt to write for both the laymen and technicians resulted in an excess of narrative and in repetitions, which do not help to clarify the concepts.—D. B. KRIMGOLD.


19
LARGER YIELDS
OF
47
BETTER CROPS FOR BETTER LIVING
THRU
LORD FAIRFAX SOIL CONSERVATION DISTRICT
USING AND CONSERVING PRODUCTIVE SOIL AND RAINFALL
SOME PRACTICES IN THE ART AND SCIENCE OF SOIL AND RAINFALL CONSERVATION
I - CORRECT LAND USE - Using the land according to its capabilities, and treating the land according to its needs: (1)Cropland, (2)Pastureland, (3)Woodland, (4)Wildlifeland, (5)Homesite
II - VEGETATIVE LAND COVER - Nature's way of building, producing and conserving
III - CONSERVATION PATTERNS AND PRACTICES - All fitting the lay of the land, the character of the soil and the farm economy
(1)- Crop Rotations - Soil building and soil conserving
(2)- Crop Rotations arranged in patterns of Alternate Contour Strips on sloping cropland, conserving productive topsoil and rainfall.
(3)- Contour Tillage - Slowing the journey of the raindrop to the sea
Crop rows and farming operations on the level
Orchards and vineyards planted on the contour on sloping land
(4)- Cover Crops - Soil protection and enrichment
(5)- Prevention and Repair of Gully and Gullies - Vegetation of road banks, stream banks and critical areas
(6)- Grassed Waterways, Drainage, Contour Furrows, Diversions - All designed to carry surplus rainfall safely
(7)- Farm Ponds - Storage of rainfall; water for livestock and wildlife, fire protection of buildings, fields, and woodland, spraying, irrigation, fish and recreation.
(8)- Productive Meadows and Pastures of Grasses and Legumes
(9)- Correct use of Lime, Fertilizer, Manure and Crop Residues - Better soil fertility and conservation, more efficient use of productive soil and rainfall, more nutritious food and feed
(10)- Woodland Conservation and Management - Sustained production of woodland products, conservation of soil and rainfall, planting of desirable areas, critical slopes and large gullies.
(11)- Wildlife Protection and Conservation on all Lands - Vegetate borders for erosion control and wildlife food and cover - Serices and Bicolor Lespedeza
SAVE THE SOIL
NATURE'S INDISPENSABLE GIFT TO MAN
See your COUNTY AGENT and your County Office of the
LORD FAIRFAX SOIL CONSERVATION DISTRICT
for a Soil Conservation Farm Plan and assistance
in developing your Conservation Farm Plan...
19
47

FAST-MOVING VIRGINIANS.—One of the up-and-coming soil conservation districts in Virginia—Lord Fairfax—has undertaken to impress every level of its citizenship with the importance of the district's program for the soil's redemption. It has prepared a clever and informative leaflet, "Save the Soil," which is being handed out to 5,000 farm families, civic clubs, business and professional groups, garden clubs, parent-teacher associations, schools, rural churches, banks, and others. Twelve hundred farm women are being reached with it through four home agents working with 40 clubs. Lord Fairfax's aggressive, intelligent campaign of education has been favorably commented on by local newspapers and numerous other leaders of public opinion. Incidentally, all members of the district board of supervisors have recently entered subscriptions for SOIL CONSERVATION Magazine. Lord Fairfax district officers are determined not only to inform others but also to keep informed themselves!

MORE BEEFSTEAKS PER CALF.—H. B. Holmes, of the Highland Soil Conservation District, Marfa, Tex., tells the following story concerning increased production from practicing good range conservation on his ranch:

"When I asked for assistance from the Highland District 5 years ago, Soil Conservation Service technicians came out and made a thorough analysis of my ranch. When they got through, they recommended, among other things, that I reduce my breeding herd of 230 cows which I was carrying on my 8-section ranch, to approximately 180. I thought they were crazy and didn't know what they were talking about, because I was selling 420-pound calves. However, I sold 30 cows the first year and the next calf crop I sold, the calves averaged about 480 pounds. This opened my eyes, and the third year I reduced my herd more than had been recommended. When I got through selling that fall, I had only 160 breeding cows left. The next year I did not creep feed any, a practice which I had been following for several years, and my calves averaged about 530 pounds. I don't mean that was just the heavy end, either; that was the entire calf crop. It was these results that convinced me that good range conservation pays."

HOLD ON THERE, BAY STATE! An element of good-natured rivalry fans the fires of progress. M. W. Lowry, in a letter to the Editor, now raises his banner in defense of Virginia's claim to one of the "firsts" in district development; says he—

"I note in the April issue of *Soil Conservation* that mention is made of a soil conservation district in Massachusetts named after a person.

"You will be interested to know that five of the soil conservation districts in Virginia are named after persons:

"The Lord Fairfax District was named after Lord Fairfax, who helped colonize Virginia.

"The Virginia Dare District was named for the first white person to be born in the United States.

"The Thomas Jefferson District includes the area around Monticello, the home of Thomas Jefferson, one of the earliest soil conservationists.

"The Robert E. Lee District was named after the famous General of the Confederate Armies.

"The J. R. Horseley District was named after one of the first members of the Soil Conservation Committee of Virginia.

"None of these individuals is now living.

"In view of the above, we cannot concede Massachusetts a first in the naming of districts for persons."

REFERENCES COMPILED BY WILLIAM L. ROBEY

SCS personnel should submit requests on Form SCS–37 in accordance with the instructions on the reverse side of the form. Others should address the office of issue.

SOIL CONSERVATION SERVICE

Federal-State Cooperative Snow Surveys and Irrigation Water Forecasts for Colorado River Drainage Basin. Division of Irrigation, Soil Conservation Service, U. S. Department of Agriculture and Colorado Agricultural Experiment Station, Fort Collins, Colorado, February 1, 1947.

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[1] From the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

The Prowers Soil Conservation District, Lamar, Colo., pays for 34 subscriptions to *Soil Conservation* Magazine. The East Canadian Soil Conservation District, Yukon, Okla., buys 21 subscriptions. One hundred copies go each month to the Waldo County Soil Conservation District, Belfast, Maine.

U. S. GOVERNMENT PRINTING OFFICE: 1947

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DETROIT

Strip cropping in the Northern Panhandle Soil Conservation District, Marshall County, W. Va. This is on the farm of A. A. Maxwell, five miles east of Moundsville. The strips were established in the spring of 1936 and have been in continuous rotations since. The slope is 37 percent; when farmed with open-row, clean-tilled crops it is essential that all rows be exactly on the contour. (Photo by Hermann Postlethwaite.)